

Optimal age to begin with Greco-Roman wrestling and reach peak performance – trends in cases of world-class medal winners of various weight groups

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ABSTRACT

INTRODUCTION: When to start doing Greco-Roman wrestling? How many years of experience are needed to accomplish world-class standard and achievements? At which age do wrestlers nowadays win their world championship or Olympic medals? What age-related trends can be observed in wrestlers of different weight groups? This study explored all these questions. **PURPOSE:** The aim of the research was to determine differences between weight groups in age-related parameters (beginning age, wrestling experience, and peak performance age) of world-class top-level wrestlers and to analyse the revealed trends. **METHODS:** The sample of entities (N=299) comprised wrestlers who won their first World Championship or Olympic Games' medals in the period 2002-2015. The sample of variables consisted of three age-related parameters: Beginning, Experience and Peak. The variables were processed by descriptive statistics. The differences between weight groups were analysed using the Kruskal-Wallis test and trends were added to graphical representation to perform analysis across years. **RESULTS:** Olympic Games or world championship (OG/WCh) medal winners started their wrestling training at the age of 10.51 ± 2.98 years. They had been training for 15.09 ± 4.28 years before they won their first medal at the age of 25.55 ± 3.10 years. The middleweight wrestlers started to train wrestling significantly earlier ($p < 0.01$), than their lightweight counterparts and most heavyweight counterparts and they acquired more wrestling experience before the first OG/WCh medal winning. **CONCLUSIONS:** The wrestling beginning age demonstrated a decreasing trend across the years of the observed period, so caution is advisable as regards early specialization. A rising trend in training experience is a consequence of a declining trend in wrestling beginning age. Analysis across weight groups indicated, although not pronouncedly, that lightweight- and heavyweight-group wrestlers may begin to train at later age and accomplish outstanding achievements with less experience. This study provides a precise set of information to wrestling coaches on when to include their trainees in wrestling, for how long one needs to wrestle before winning the first medal and at which age we can expect a wrestler to win his/her first major competition (WCh or Olympic) medal in accordance with the respective weight groups.

Key words: Wrestling World Championships, Olympic Games, Greco-Roman style, weight categories, adult wrestlers, experience, achievements

Introduction

Age-related parameters, like the appropriate age (span) to start with wrestling training, wrestling experience (required for certain sport achievements), sports career peak age, and

career cessation age are very important for wrestlers and, especially, coaches for optimal design of one's sports career from its beginning to the end of competition. This issue has already been addressed by Mirzaei et al. (2013) on seven most successful world countries, by Baić, Karninčić, and Šprem (2014), with the sample of European medal winners, and by Šprem (2013), with the sample of European and world medal winners. Previous literature recommended that specialized wrestling training should begin at the age span of 11-13 years (Bompa, 1999), or at 13 years of age (Petrov, 1977). The study by Baić and colleagues reported that the European medal winners started with wrestling at the age of 10.27 ± 2.79 years (Baić, et al., 2014). Consequently, we can feasibly suggest that 10 years of age is an appropriate age to start with wrestling training. However, world population, hence world wrestling population as well, living in various geographical areas, is not uniform with regard to phenotypic and genotypic characteristics (King, Stansfield, & Mulligan, 2006). So, would we find these various genotypic and phenotypic characteristics reflected in the age-related parameters, or would they appear to be the same worldwide? Furthermore, years and years of training experience is needed for any noteworthy achievement in most sports branches, wrestling alike (Pallares, Lopez-Gullon, Torres-Bonete, & Izquierdo, 2012). To win a European-level medal, wrestlers had to have 14.61 ± 4.02 years of training experience (Baić, et al., 2014). Yet, competition at the world championships and/or Olympic Games is even more intense, so a question arises: is experience of 14.61 years enough to win an OG/WCh medal or do wrestlers must train for a longer period? According to some researchers, there is an age difference between elite-level wrestlers and their less successful counterparts – the former are older (Lopez-Gullon, et al., 2011). Nonetheless, medal winners' age appear to decrease. Curby (2004) reported that Olympic winners were 27.15 years old on average, whereas Baić and colleagues (2014) published that the European medal winners were on average 24.86 ± 3.29 years old with the note that the trend in medal winning age decreased. The mentioned findings are in line with the theory saying that the best, peak wrestling performance is achieved at the age span of 24–27 years (Bompa, 1999). Interestingly enough, all the analysed age-related parameters manifested a decreasing trend in the sample of European wrestlers – children start doing wrestling ever earlier; ever less experience (in years) is needed before a noteworthy medal winning, and, consequently, medal winning wrestlers are ever younger. Earlier biological maturation (Lingor & Olson, 2010), advances in sports training methodology, and ever expanding selection of legal (sometimes even illegal) supplementary substances are among relevant causes of such trends. Regardless of causes, coaches must know the trends and take them into account in order to be able to harmonize sports training programmes with biological maturation and to set reasonable, attainable goals for their wrestlers. Analysis across weight classes at the European level (Baić, et al., 2014) demonstrated that it was feasible to start wrestling later and had less years of experience before a medal winning at the extremes of weight spectrum (the lightest and heaviest weight categories), probably due to less intense rivalry in these weight classes. Competition at the world championships and Olympic Games in all weight categories is even more intense, so we were curious if there were any differences in age-related parameters at the global level. The aim of the research was to establish differences between weight groups in age-related parameters (beginning age, wrestling experience, and peak performance age) of top-level world-class wrestlers and to analyse the revealed trends.

Methods

The sample of entities was comprised of a group of 229 Greco-Roman wrestlers who won their first Olympic Games or world championship (OG/WCh) medal in the period 2002–2015. The entire sample was divided into three subsamples/groups: Lightweight ($n=84$; weight classes: 55 kg, 60 kg, 66 kg, and a new class, 59 kg), Middleweight ($n=93$; weight classes: 71 kg, 75 kg, 80 kg), and Heavyweight ($n=53$; weight classes: 85 kg, 96 kg, 130 kg).

The sample of variables consisted of three age-related variables: age at which medal winners started doing wrestling (Beginning), years of training experience before the first OG/WCh

medal winning (Experience), and age at which wrestlers won their first OG/WCh medal (Peak). All variables are expressed in the number of years. The data were retrieved from the wrestlers' publicly available charts, published at the United World Wrestling (UWW) site. The data were processed by the statistical package Statistica 12 (Statsoft, USA). Descriptive statistics were computed (arithmetic means and standard deviations). Kolmogorov-Smirnov test was used to explore data goodness of fit (distribution normality). To establish possible differences between the three weight groups Kruskal-Wallis test was used and trends were added for the analysis across the observed years. The level of significance was set at $p < 0.05$.

Results

(Table 1.) Descriptive statistics (arithmetic means and standard deviations) and goodness of fit (Kolmogorov-Smirnov test) for the variables of weight groups together and, separately, of each of the three specific weight groups

	All groups		Lightweight		Middleweight		Heavyweight	
	N=229	n=84	n=84	n=93	n=93	n=53	n=53	
	Mean±SD	Mean±SD	K-S	Mean±SD	K-S	Mean±SD	K-S	
Beginning	10.51±2.98	10.92±2.80	$p < 0.10$	10.02±2.88	$p < 0.20$	10.73±3.34	$p < 0.20$	
Experience	15.09 ± 4.28	15.06±4.20	$p < 0.10$	15.86±4.20	$p < 0.01$	15.35±4.73	$p < 0.20$	
Peak	25.55 ± 3.10	24.99±3.04	$p < 0.05$	24.99±3.04	$p < 0.20$	25.94±3.16	$p < 0.20$	

Apparently (Table 1.), two variables (Lightweight/Peak; Middleweight/Experience) deviated significantly from the normal distribution, therefore further data processing was completed using non-parametric statistical methods.

(Table 2.) Differences (Kruskal-Wallis test) between the three wrestling weight groups in the age-related variables: Beginning, Experience and Peak

	Beginning		Experience		Peak	
	Middle	Heavy	Middle	Heavy	Middle	Heavy
Light	$p = 0.06$	$p = 1.00$	$p = 0.01$	$p = 0.45$	$p = 0.17$	$p = 0.23$
Middle		$p = 0.40$		$p = 0.98$		$p = 1.00$
Kruskal-Wallis	H=5.87 $p = 0.05$		H=8.01 $p = 0.02$		H=4.70 $p = 0.09$	

Note. Light – Lightweight; Middle – Middleweight; Heavy – Heavyweight

It is obvious from Table 2 that there was a statistically significant difference ($p < 0.01$) between the lightweight and middleweight groups of wrestlers in their years of wrestling experience, whereas the difference in the beginning age was on the border of significance ($p = 0.06$).

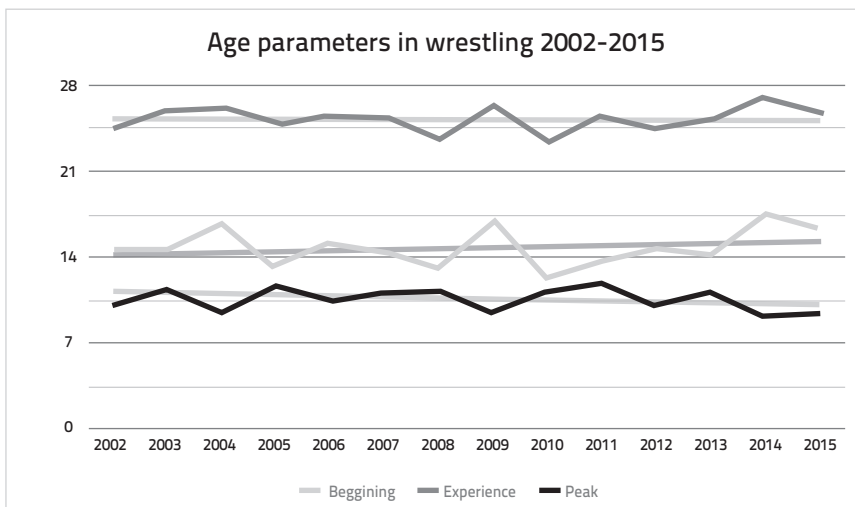


Figure 1. Trends of age-related parameters for the period of 2002-2015 - world-class Greco-Roman wrestling medal winners.

The line of beginning age (Figure 1.) of world-class wrestlers is slightly declined, whereas the line of experience needed for OG/WCh medal winning is slightly inclined. Peak performance line demonstrates constant trend throughout the analysed 14 years.

Discussion

Within the analysed period, prospective OG/WCh medal winners started to train wrestling at 10.51 ± 2.98 years of age. The finding is in line with the findings regarding the European level and manifests the same decreasing trend. Children's inclusion in organized sport has been shifted tremendously nowadays, almost to the early childhood (to 3-5 years of age), but not because of earlier biological maturation; the shift has commercial and performance conditioned roots. A sport branch lagging behind in talent identification and selection will lose quality novices to other sports disciplines. It is possible to lower the beginning age in wrestling, but it would enormously increase the risks of early specialization, probably leading to serious health issues and/or early drop-out from sport (McKay, Broderick, & Steinbeck, 2016). The contemporary development of sport forces an early start of systematic training. This is connected in general to the intensive exploitation of the child's organism, which causes injuries, overload degenerative changes, deterioration or even loss of health. Some countries take part in this "race" but the fact is it is against Children's Rights Convention of the UN (Klodecka-Rozalska, 1991). The analysis of the age at which martial arts were taken up by about 20000 champions (master class) of that discipline (Tumanjan, 1984) demonstrated that competitors who started training late, achieved almost the highest class. For example, a considerable majority of free style and classical wrestlers started practicing the discipline after they were 13 years old. This observation may confirm that it is not advisable to start early the training process in wrestling. Wrestlers of lighter weight group started their training later (almost significant, $p=0.06$); the same trend also exists at the European level (Baić et al., 2014). Middleweight-group wrestlers' inclusion in the sport-specific organized training was the earliest, so we can say that a somewhat less intense rivalry is obvious at the ends of weight spectrum, a phenomenon apparent at the European level and global level alike, although the global-level differences were not statistically significant. In research conducted by Mirzaei et al. (2013) Iranian medal winner begin with wrestling much later (12.25 ± 2.19 yrs) and won their medals much earlier, after only 6.97 ± 3.06 years of practise. The possible reason for that is great tradition and popularity of wrestling in Iran, there are a lot of quality sparring partners, good training methodology and wrestlers can collect experience faster. The variable wrestling experience manifested an increasing trend at the OG/WCh level. Such a

trend is probably due to the decreasing trend in beginning age, whereas the medal-winning age has been constant throughout the years. Experience is a multi-layer category and may imply training experience and/or combat experience. Due to the increased number of competitions in recent wrestling calendars and the practice of specific international sports preparation, which gathers quite a number of high quality sparring partners (Hodges, 1995), athletes rapidly acquire combat experience; on the other hand, training experience has been accelerated by the application of better training methodology and advances in sports pharmacology (de Andrade Kratz, et al., 2016; Manjarrez-Montes de Oca, et al., 2013), although within the limits of biological development laws. When experience is analysed from the aspect of weight group, then the longest experience of the middleweight group becomes obvious, yet the statistical significance was obtained only between the lightweight and middleweight group. The average age at which wrestlers win OG/WCh medals is 25.55 ± 3.10 years. According to Bompa (1999), wrestlers are at the peak of their performance, accomplishing their highest sport achievements, at the age of 24–27 years, whereas Curby (2004) says it is the age of 27 years. The obtained trend line has been anchored at the age of 25.5 years throughout the investigated period (14 years), which is in concordance with the findings regarding the Iranian Olympic medal winners' age of 24.9 years (Golbar, Gharakhanlou, Barmaki, Khazani, & Khorshidi-Hosseini, 2015). A slight decrease of this parameter is a feasible assumption. If the wrestlers' improvement can be attributed to biological acceleration and sports training advances, then it is an acceptable trend; however, if the improvement has been induced by a phenomenon known in kinesiology as "burnout", caused by a premature specialization (Brenner, 2016; Feeley, Agel, & LaPrade, 2016) and inappropriately early onset of wrestling training, then it warrants serious future research. Yet, the heavyweight group wrestlers were slightly older at the moment of OG/WCh medal winning, although the difference was not significant. The similar, yet statistically significant, difference was observed in the European medal winners (Baić, et al., 2014), so it can be concluded that "heavier" wrestlers should be "more mature". Age parameters are under influence of numerous factors and average span of time needed to achieve a champion's rank (level) should be treated in a flexible way that is, it should be defined within the limits involving most of the cases (Puni, Starosta, 1979; Starosta, 1982; Starosta, Handelsman, 1990).

Conclusion

Beginning age manifests a modest decreasing trend, whereas wrestling experience has a modest growing trend. These two phenomena are correlated: wrestlers have more experience because they commence to train earlier. The trend of OG/WCh medal winning age is consistently at 25 years. Wrestlers of the lighter weight groups started their training somewhat later than their heavier counterparts and had less years of experience. Heavier wrestlers were older when winning their first OG/WCh medal. This study offers a precise set of information to wrestling coaches on when to include their trainees in wrestling, for how long one needs to wrestle before winning the first medal and at which age we can expect a wrestler to win his/her first major competition (WCh or Olympic) medal in accordance with the respective weight group.

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